

BE Mechanical. 4TH Yr, 2ND, Semester Examination- 2019

SUBJECT: Material Handling

Time: 3 hours

Full Marks: 100

Assume any data only if neededAnswer any FIVE questions

1. (a) How a material is coded? Give any one example with code. What is flowability of a material?
 (b) Write at least four points on advantage and disadvantage associated with Unitization of load.
 (c) What are basic objectives of Material Handling System? Discuss in detail. [6+6+8]
2. (a) A Screw conveyor is to be designed to convey moulding sand at an inclination of 20° with the horizontal. The required capacity is 60 tones per hour, length of conveying is 25 mtr, bulk density of sand 1.60 ton/cubic mtr and is abrasive in nature, loading efficiency is 0.125, screw pitch = $1.0D$ (where D = nominal diameter of screw), r.p.m of the screw is 50, inclination factor is 0.65, mass flow rate is 60 tones/hr, progress resistance coefficient is 4. Find out:
 (i) nominal diameter of screw in meter.
 (ii) total power of screw required in Kw.
 (b) Draw neatly and name different types of screw profiles, which are used in screw conveyors. Provide side view for each of the type of the profiles. State just the characteristics of bulk materials those are appropriate to each of the screw profiles for handling. [10+ (6+4)]
3. (a) Calculate the motor power output required in KW for the belt conveyor, having the following specifications:
 Peripheral force = 2444.07 N, belt speed = 2.65 mtr/sec, wrap resistance at driving pulley = 230N, drive pulley bearing resistance = 44N and final transmission efficiency is 0.80%
 (b) Find out the width of the belt of a horizontal 3- roller troughed belt conveyor designed to convey 150 Tonnes/hr of foundry sand for sand plant at a speed of 2.5 m/sec. The side idlers are set at angles of 20° . Given the following data:
 (i) Bulk weight of material is 0.8 tons/m^3 .
 (ii) Static angle of repose of the load is 45° .
 (c) State general characteristics of belt conveyor. [6+10+4]

[Turn over

4. (a) In a neat sketch, show the general arrangement of a belt conveyor system and label the different important parts.
- (b) What are the different types of idlers used in a belt conveyor system? Discuss the constructional feature and application of impact idler. [12+8]
5. (a) Show with neat sketches, different types of buckets used on bucket elevators and state their uses. How the buckets are designated?
- (b) Draw neatly the feeding and discharging arrangement of a Directed gravity discharge type of bucket elevator. Label the diagram.
- (c) A bucket elevator is to be designed to handle aluminium ore of 100 tons per hour. The height of elevator is 20m. Calculate the individual capacity of bucket in litres on the basis of the following data:
- i) bucket filling factor = 0.75
 - (ii) material bulk density = 1300 kgf/m^3 .
 - iii) elevator speed = 0.83 m/sec
 - iv) bucket spacing = 0.320m [6+6+8]
6. (a) Briefly describe the basic principles of operation of a positive pressure system of low pressure pneumatic conveying. If necessary give figures to enumerate this.
- (b) State briefly the merit and demerits of pneumatic handling system of handling materials.
- (c) Discuss the classification of pneumatic conveying system. [8+8+4]
7. (a) Sketch at least three different types of jib cranes used in construction, ware houses and the ship yard.
- (b) Sketch the Plan and elevation of EOT crane and label different parts. [8+12]
8. (a) Explain total resistance to motion take place in case of unpowered roller conveyor.
- (b) Explain the difference between unpowered and powered roller conveyers. [12+8]